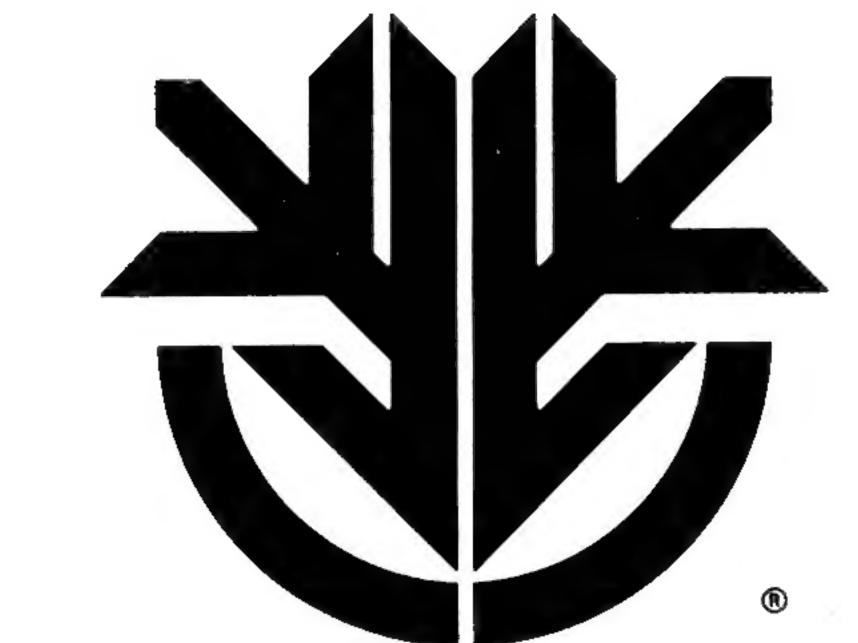
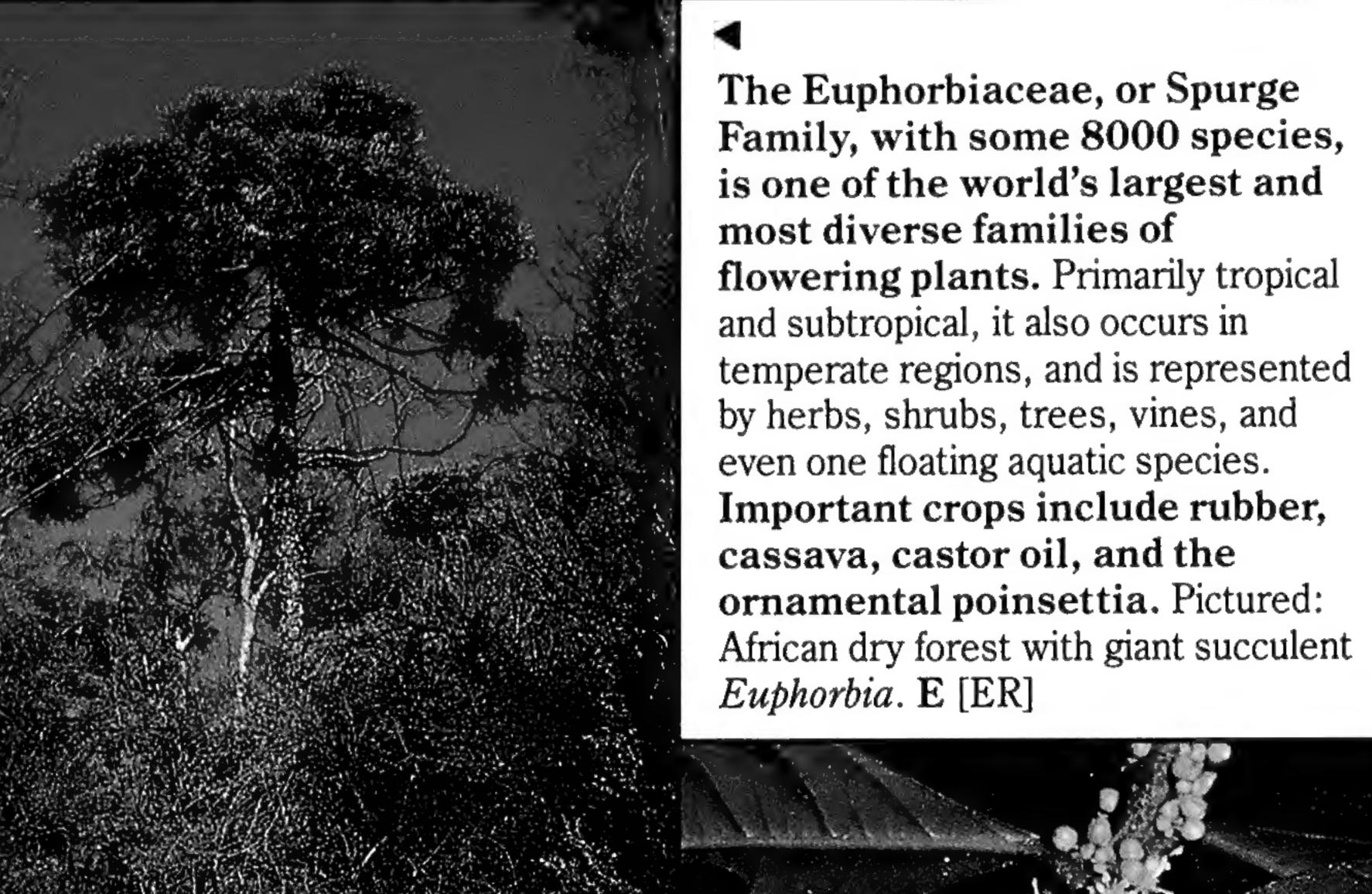


The Euphorbiaceae Family

Research at the Missouri Botanical Garden





Species new to science: MBG scientists described 197 new species in 1988. The unusual genus *Croizatia* was discovered in Venezuela by MBG scientist Julian Steyermark (1909-1988), who discovered more than 2200 new species and collected more than 130,000 specimens in his career. In 1984, MBG scientist Paul Berry collected specimens with flowers, allowing the broader relationships of Croizatia to be understood for the first time. Pictured: Croizatia naiguatensis, Venezuela. P [PB]

Research: The Missouri Botanical Garden hosts an international conference in August 1989, gathering specialists in the Euphorbiaceae from institutions all over the world to increase our understanding of this important family, which is still relatively poorly known. MBG researchers Michael J. Huft and Gordon McPherson specialize in the study of the Euphorbiaceae. Pictured: succulent Euphorbia in Namibian Desert, southwestern Africa. E [ER]

Classification: Subfamily

Diversity: Euphorbia, with approximately 1600 to 2000 species, is a magnificent example of variation within a genus, yet each species displays the characteristic inflorescence: a highly reduced cup-like structure, called a cyathium, which resembles a single flower. At the rim of the cyathium there are usually four or five nectar-producing glands, which sometimes have petallike appendages. Pictured: Snow-onthe-Mountain, Euphorbia marginata, Nebraska, U.S.A. E [MH]



Grady Webster of the University of California, Davis, who recognizes five subfamilies. This widely accepted system is based on number of seeds, latex constituents, and pollen characteristics. Except for seed number, there is no obvious way to place a genus in the proper subfamily by sight. Classification: Subfamily Oldfieldioideae, 70 species. This smallest and

together several genera that had previously been scattered throughout the family.

least familiar of the five subfamilies was only recently recognized. It brings

Pictured: Picrodendron baccatum, West Indies. [JH]

Classification: The diversity within the Euphorbiaceae has fostered many

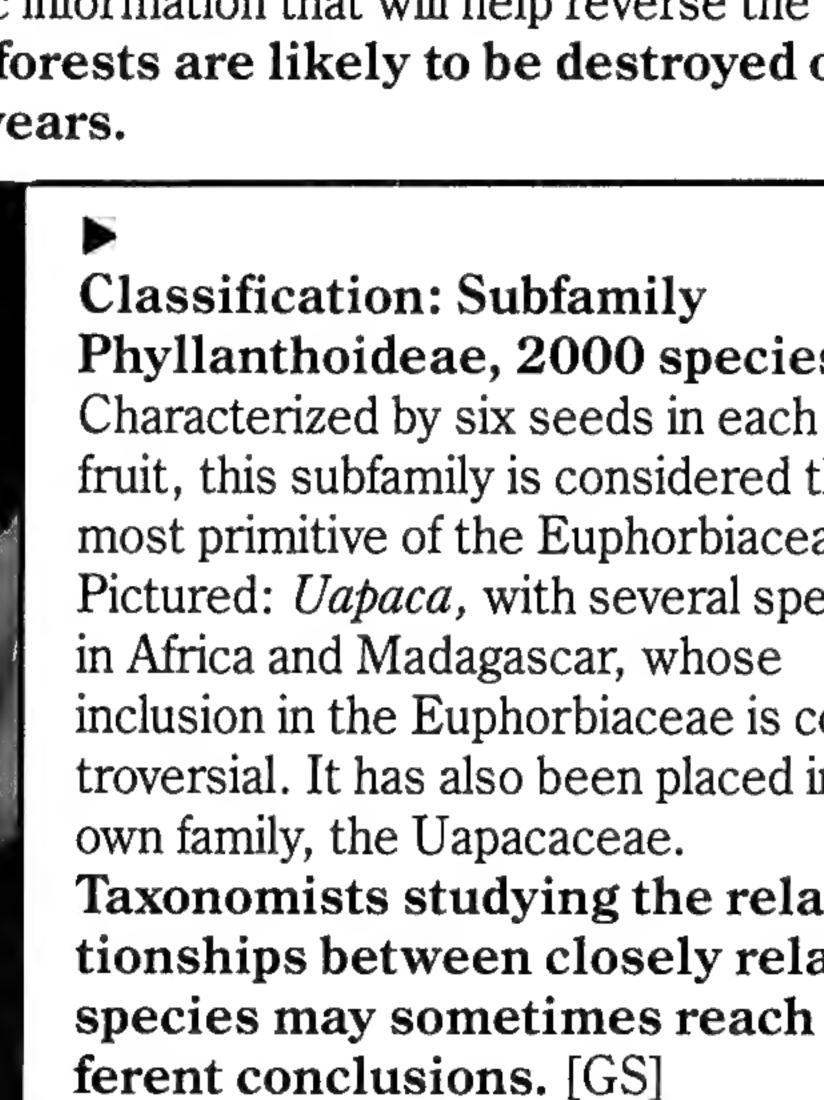
attempts at defining groups of related genera. The most recent system is by

Habit: Trees, shrubs, herbs, and vines. The Old World tropics has the richest concentration of euphorbiaceous species, closely followed by the New World tropics. A widely recognized characteristic of the Euphorbiaceae is the three-lobed fruit, which contains three or six seeds, depending on the subfamily. Pictured is flowering spurge, Euphorbia corollata, a common species of the eastern United States, including Missouri. E [WB]

The Tropics: At least two-thirds of all plants and animals on earth live only in the tropics. Most are unknown scientifically and in danger of extinction. Of the approximately 250,000 species of flowering plants in the world, two-thirds occur only in the tropics.

Deforestation: Tropical evergreen forests cover 7% of the earth's surface and are essential to the stability of global climate and hence to human welfare; yet 60 million acres of lowland rainforest are destroyed every year. Explosive population growth, widespread poverty, and poor land use are underlying causes. Tropical forests are being consumed rather than managed for human benefit.

MBG Research: In cooperation with scientists from the countries involved, MBG researchers are seeking the basic information that will help reverse the process of deforestation. All tropical forests are likely to be destroyed or permanently damaged within 50 years.



Phyllanthoideae, 2000 species. Characterized by six seeds in each fruit, this subfamily is considered the most primitive of the Euphorbiaceae. Pictured: *Uapaca*, with several species inclusion in the Euphorbiaceae is controversial. It has also been placed in its Taxonomists studying the relationships between closely related species may sometimes reach difEuphorbia. [WB]

Euphorbioideae, 2500 species. Dominated by the cyathium-bearing genus Euphorbia, this group, which also includes Sapium, Sebastiana, and Mabea, has milky latex, or sap, which is usually caustic and poisonous. Flowers in most genera are extremely inconspicuous and are highly congested in compact inflorescences, or groups of flowers. Pictured is Monadenium, a small African genus of succulents closely related to

Classification: Subfamily Crotonoideae, 1500 species. Characterized by harmless and sometimes colored latex, this assemblage includes such well-known genera as Croton, or croton; Manihot, or cassava; Jatropha; and Cnidoscolus, or Bull-nettle. Pictured is a species of Ricinocarpus, a genus of about 15 species in Australia and one on New Caledonia. [GW]



Classification: Subfamily Acalyphoideae, 2000 species. Characterized by colorless latex, this group includes Acalypha, Tragia, and Dalechampia. Pictured: Dalechampia boiviniana, Mauritius, Indian Ocean. [DL] International Collaboration: MBG works closely with institutions and scientists worldwide to produce regional floras and monographic studies of poorly known plant groups, concentrating on the plants of North America, Central and South America, Africa, Madagascar, and the People's Republic of China.

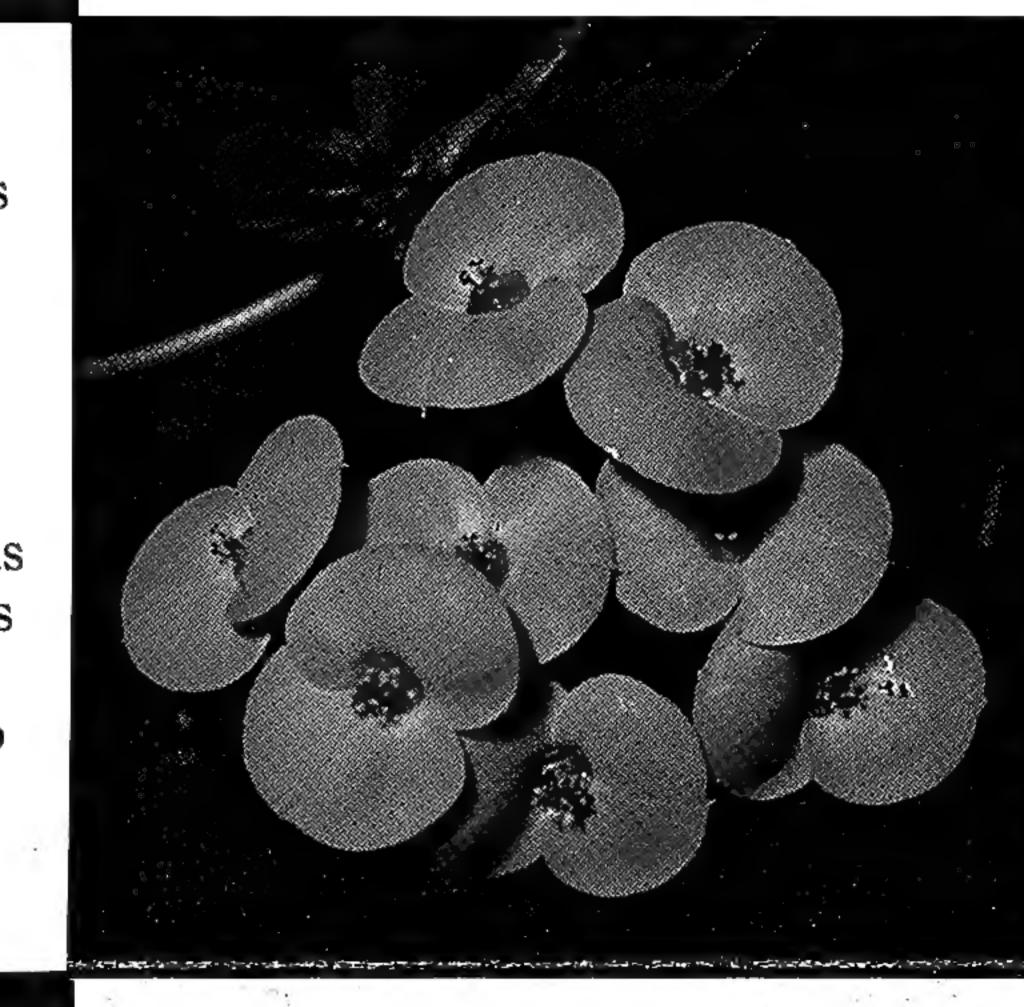
Horticulture: Many Euphorbiaceae are sought after for their striking foliage and are cultivated for their showy leaves, bracts, or stems. Best known is the poinsettia, with its attractive red bracts. Another, which has produced remarkably varied forms in cultivation, is the leaf ornamental croton, Codiaeum variegatum (pictured), of east Asian origin and related to the genus *Croton*. Other leaf ornamentals are in the genera Breynia and Acalypha. C [KS]



Horticulture: The southeast Asian shrub, Acalypha hispida, is widely cultivated throughout the tropics, where the strikingly red, tassel-like inflorescences are a common sight. These tassels consist of bright red bracts and inconspicuous flowers. A [KS] **Deforestation: Commercial** lumbering is the leading cause of forest loss in tropical and subtropical Asia. Clearing the forest for agriculture and cattle raising are the main threats to forests in the Neotropics.



Horticulture: Crown-of-thorns, Euphorbia millii from Madagascar, has red petal-like bracts that are actually modified leaves. E [ER] Extinction-Endemism: Of the 10,000 plant species in Madagascar, 75% are endemic, occurring only on the island. Deforestation has already destroyed 90% of the country's forests, and many of the island's unique species are extinct, lost to mankind forever. MBG collaborates on an innovative conservation and collection program on Madagascar.



Horticulture: The Christmas

ornamental member of the

is native to western Mexico.

Poinsettias are characterized by

colorful bracts, or modified leaves,

surround a compact collection of

cyathia. E [WB] [MH]

which appear to be petals. The bracts

zones as a robust herb, it is a large

pulcherrima, is the best known

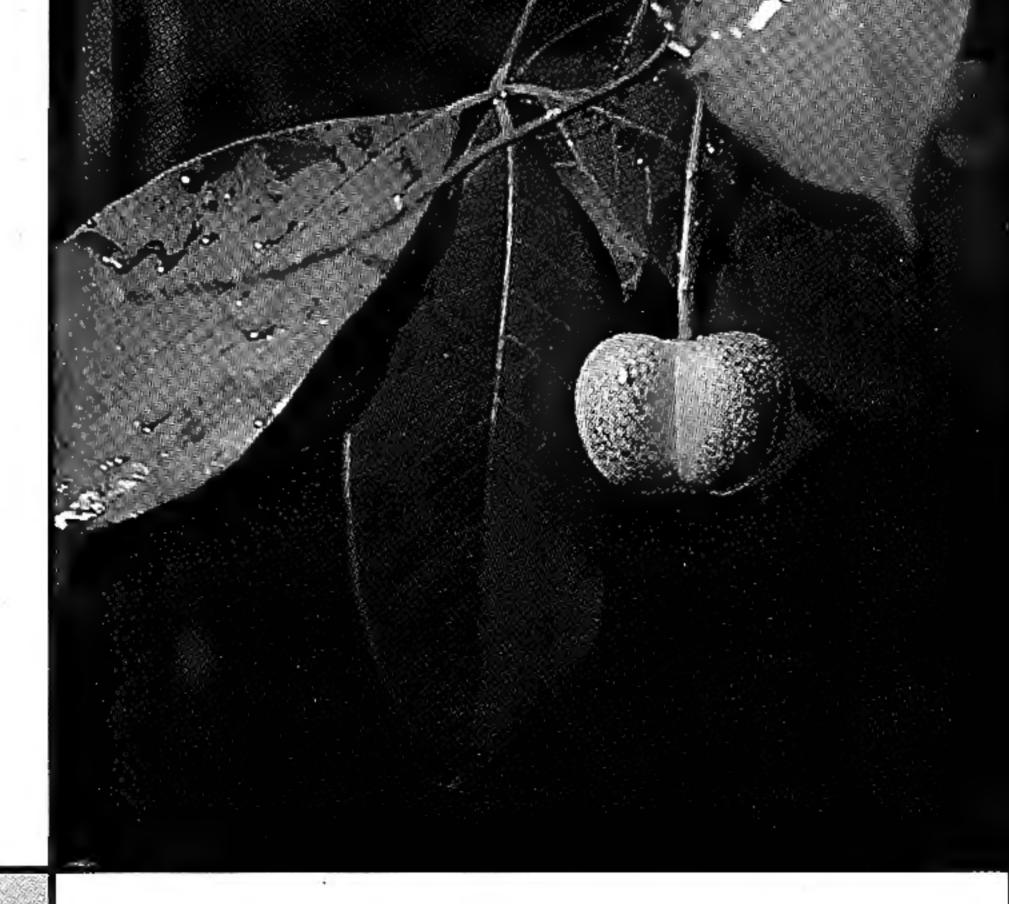
Euphorbiaceae. Grown in temperate

shrub throughout the tropics, where it

is even found growing in fence rows. It

poinsettia, Euphorbia

Economics: Natural rubber is a product of a large South American euphorbiaceous tree, *Hevea* brasiliensis. The latex or sap, from which the rubber is made, is collected by allowing the latex to run from V-shaped slashes in the bark into a bucket. Although synthetic rubber was introduced in 1931, natural rubber remains important, and more than 580,000 metric tons were consumed annually during the early 1980s in the United States alone. C [MB] [GD]



Ethnobotany: Fresh bark from the

common tree of western Amazonia, is

taken internally for ulcers. These are

Dragon's Blood Croton lechleri, a

used locally for healing superficial

wounds, and a desiccated extract is

good examples of what we can

a Peruvian market. C [MD]

learn from native uses of plants.

Pictured: a strip of bark is being sold in

Ecology: Although the milky latex of succulent euphorbias is poisonous and often very caustic, some herbivores, such as this insect chewing on a succulent Euphorbia, have found mechanisms to deal with the toxins and eat the watery leaves, which are poisonous to most herbivores. E [ER]



genera shown to be high in phorbol ester

Cnidoscolus texanus, Oklahoma. C [MH]

Economics: Cassava or manioc,

main food crops throughout the

roots is used in breads and is the

source of tapioca. Elaborate

tropics. The flour made from cassava

preparation is necessary to remove the

poisons, or toxins, found in the roots.

Only 20 of the 250,000 species of

flowering plants account for more

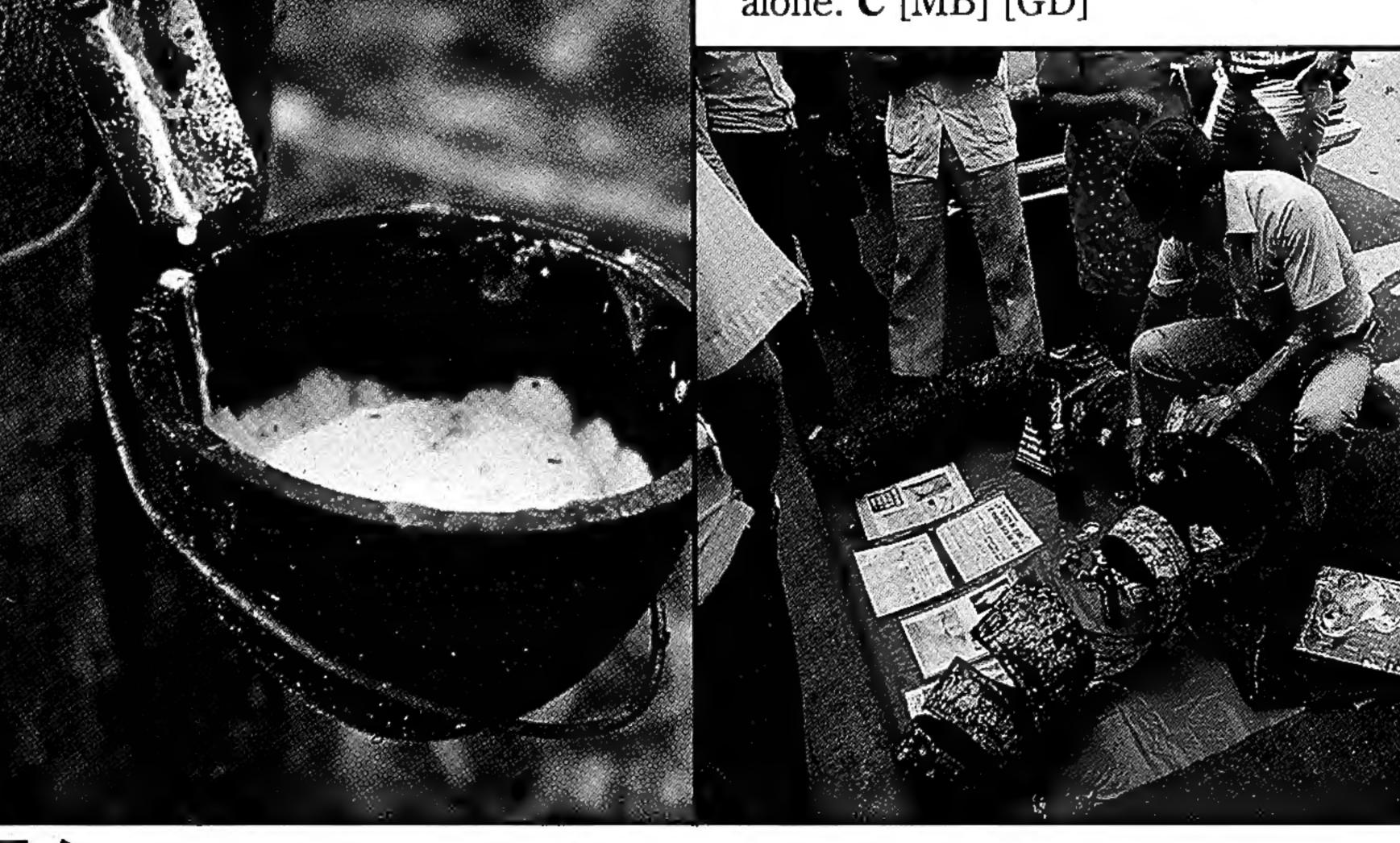
Manihot esculenta, is one of the

content is *Cnidoscolus*. Pictured:

Economics: Many members of the Euphorbiaceae contain compounds known as phorbol esters. These are well known tumor-promoting agents and are useful in cancer research. MBG, The New York Botanical Garden, and a consortium from the University of Illinois at Chicago and Harvard University are involved in collecting plants for screening by the National Cancer Institute. Among

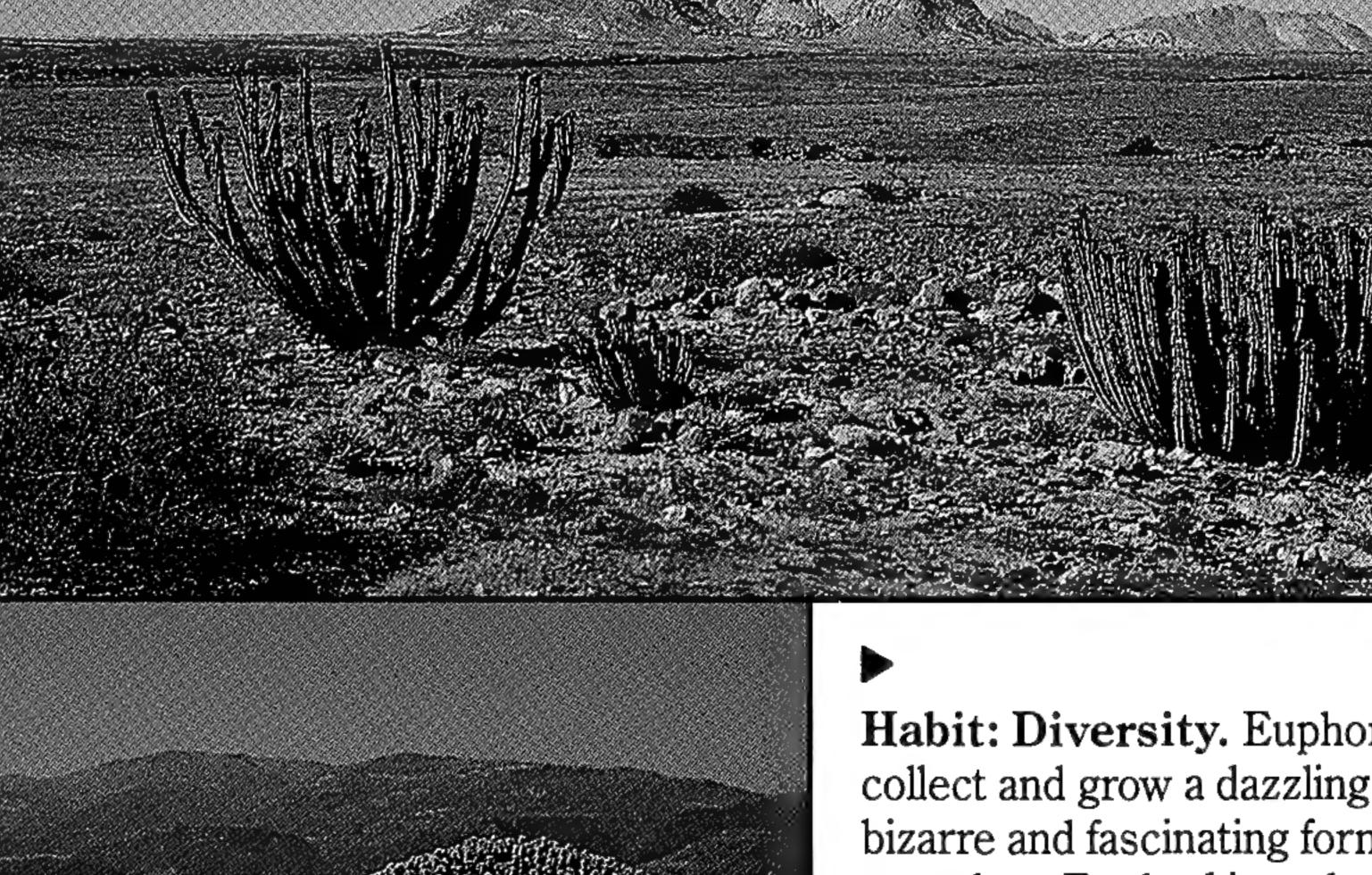
Economics: Castor oil which comes from the seeds of the castorbean plant, Ricinus communis, is a strong cathartic and also finds industrial use in lacquers, paints, cosmetics, and insulation products. Ricin, one of the most toxic compounds known, is isolated from Ricinus seeds, but does not occur in castor oil. It may eventually be used to help formulate an anti-cancer agent, and is a good example of a poisonous plant compound that can benefit humans. A [WB]

Economic Plants—Conservation: Urgent attention must be given to conserving and studying plants of potential economic importance. MBG scientists frequently describe new species that may become important as foods, chemicals or energy sources if they can be studied before they disappear forever. Only a few kinds of plants are used by human beings; extinction is occurring more rapidly than discovery and scientific understanding.



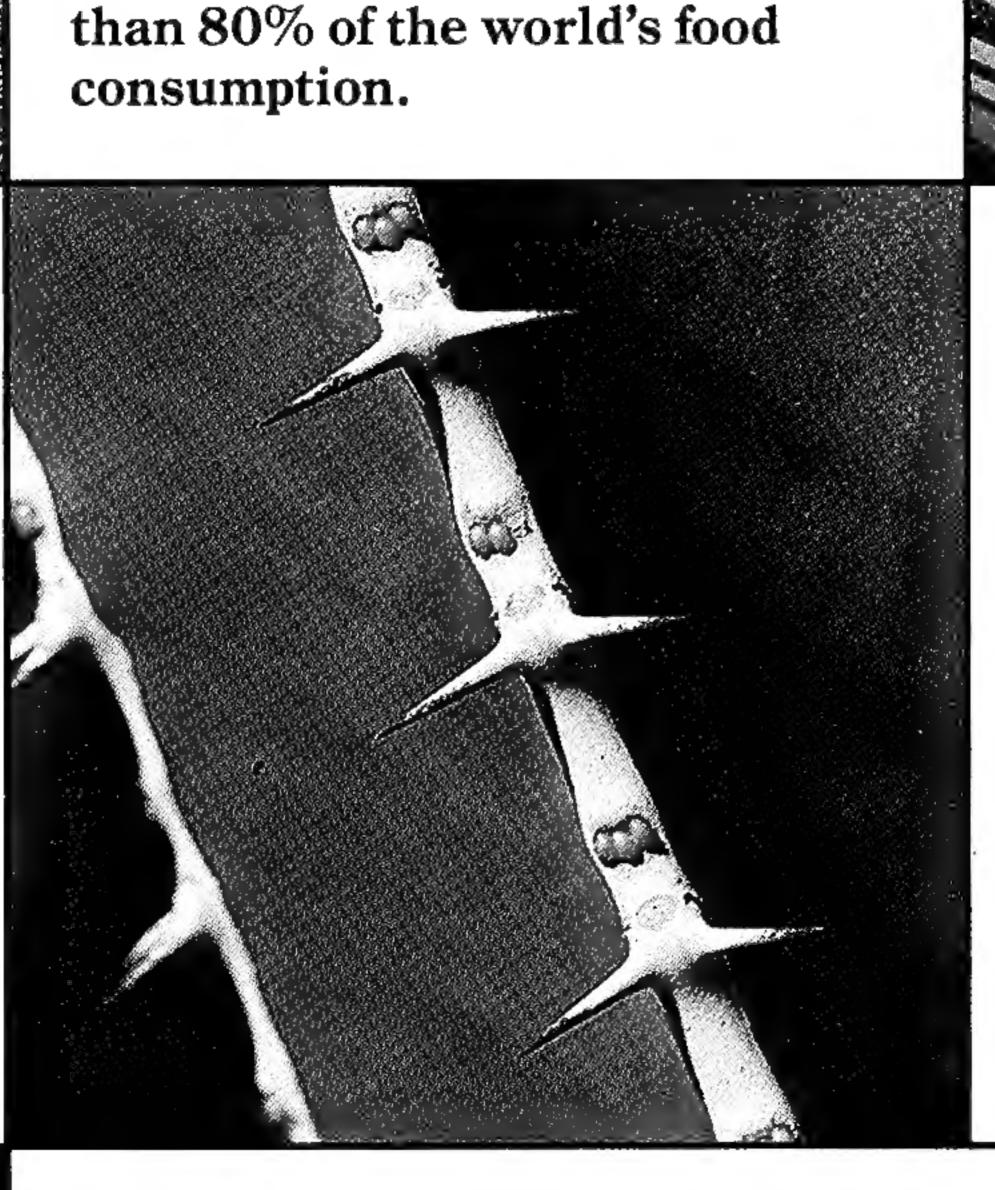
Convergence: Several hundred species of succulent Euphorbia are known from sub-Saharan Africa, and a few are native also to north Africa, Asia, and South America. The resemblance between succulent euphorbias and cacti is one of the best examples of convergence, a phenomenon in which unrelated species strongly resemble each other in appearance. Succulent euphorbias occur in the Old World in the same habitats occupied by the unrelated cacti restricted to the New World. (Right) Euphorbia species in the Namibian Desert, southwestern Africa. E [ER]. (Below) Euphorbia breviarticulata in Kenya. E [PR]

Tropical Ecology: Tropical ecosystems store nutrients in their living organisms, unlike temperate ecosystems, where nutrients are largely stored in the soil. Clearing tropical forests makes regeneration almost impossible, creating "green deserts" of very low productivity. Once the tropical forest is destroyed, the ecosystem is not renewable.



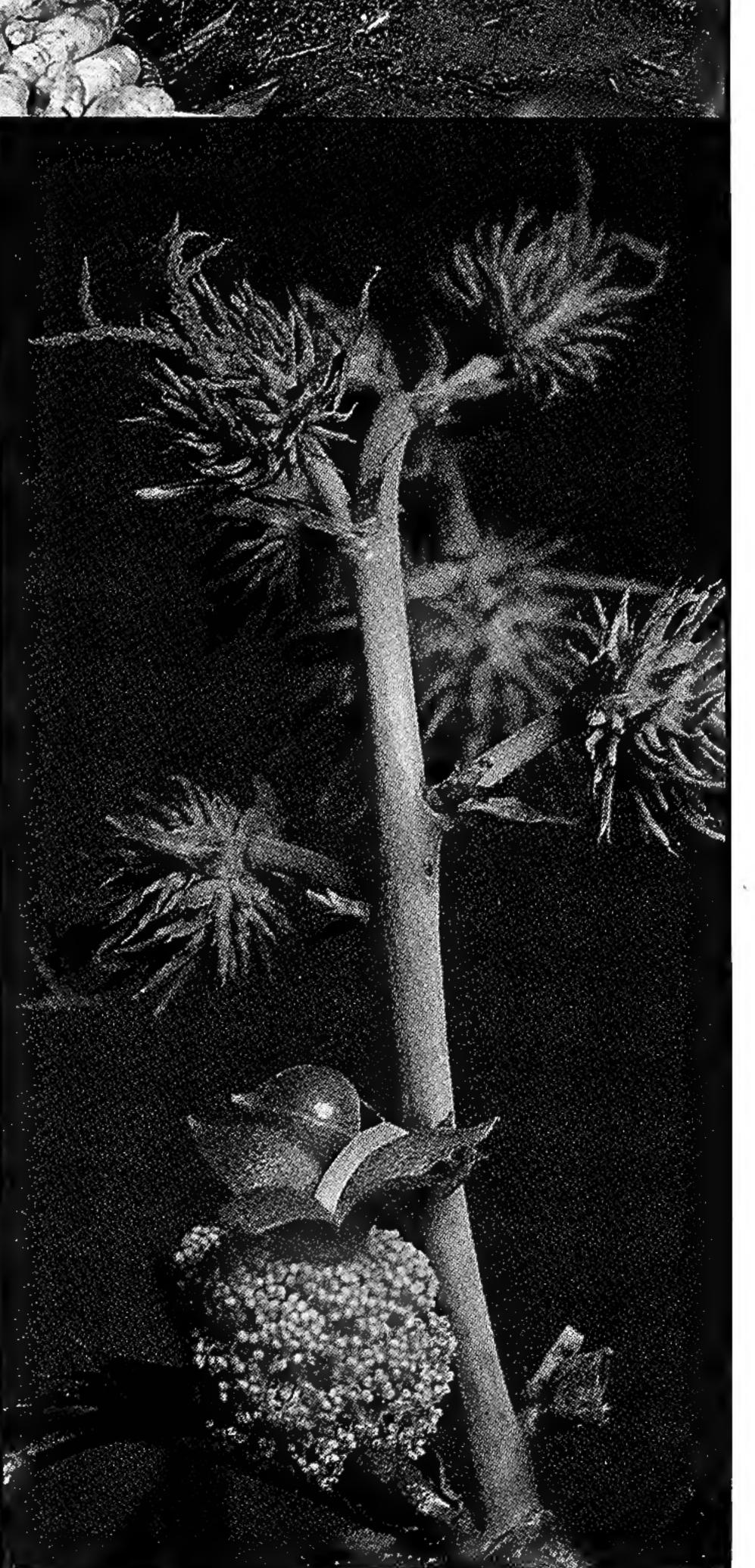
Habit: Diversity. Euphorbia fanciers collect and grow a dazzling array of bizarre and fascinating forms of succulent *Euphorbia* and related genera. Tree-size specimens are cultivated in gardens and parks throughout the tropics. E [WB]

Scientists have discovered and named no more than one out of six of the more than three million tropical organisms.

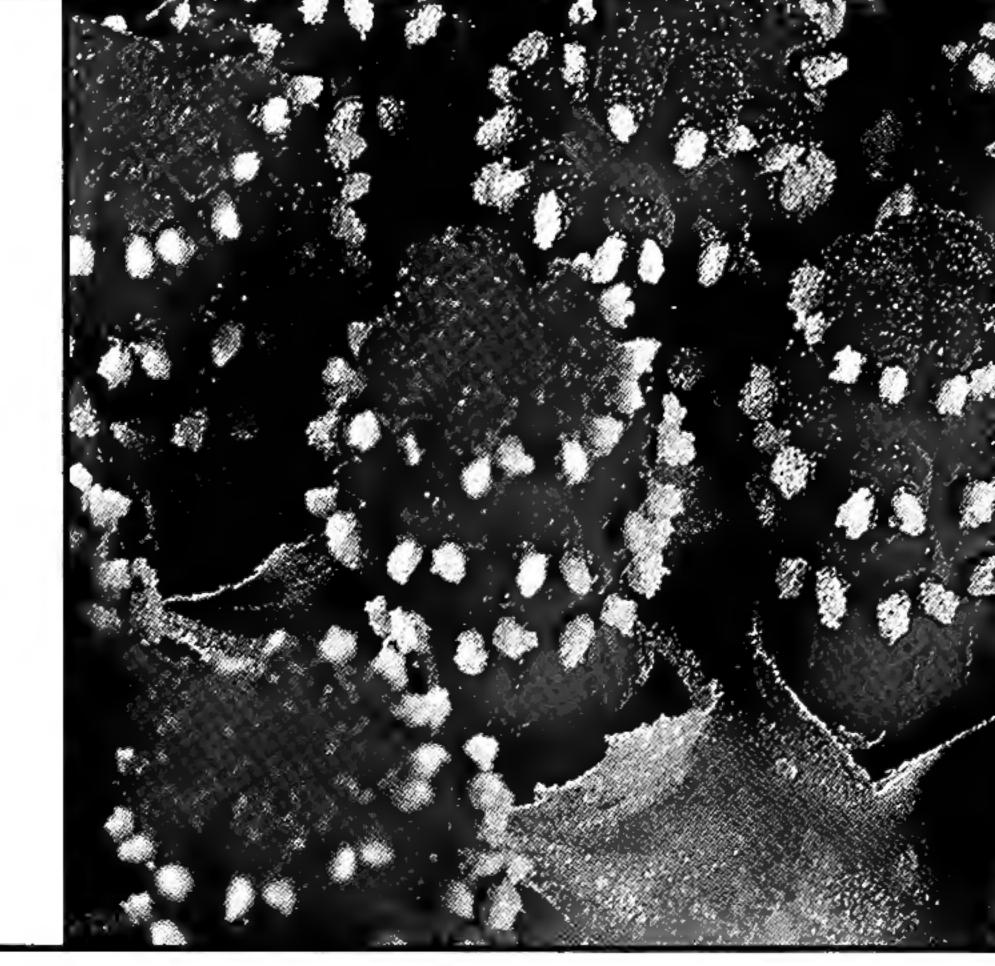


Flowers: Unisexual. Although dioecious arrangements exist—male and female flowers on separate plants—the most common situation in the Euphorbiaceae is an inflorescence with female flowers below and male flowers above, as in the castor bean plant, Ricinus communis (pictured). The flowers in the Euphorbiaceae are exclusively

unisexual. A [WB]



Flowers: Compact. Although small inconspicuous flowers are a constant throughout the Euphorbiaceae, this reduction is carried to an extreme in the sandbox tree, Hura crepitans. Here, numerous minute male flowers are arranged in rows on a fleshy axis, which breaks through a thin bract. A number of fleshy axes make up the extremely compact inflorescence. E [KST]



Habit: Diversity. The succulent

Moroccan desert, gives protection

against water loss in the dry desert

environment. Euphorbia sp. E [ER]

habit found in some euphorbias, such

as this giant cushion-like mound in the

Flowers: Complex. Dalechampia, a genus of about 100 species of mostly herbaceous vines or occasionally erect herbs, has evolved a very complex inflorescence that looks like a single flower. The Dalechampia inflorescence has not reached the elegant simplicity of the Euphorbia inflorescence, however. In most species of Dalechampia, a pair of conspicuous white, purplish, cream, or greenish bracts advertise the inflorescence. Dalechampia ipomoeifolia (Kenya). A [PM]



International Cooperation: The future of tropical vegetation and the survival of thousands of species depend on combining economic development with conservation, addressing the needs of local residents, who often see conservation projects as threatening their very survival. The number of people in the tropics is expected to double in less than 30 years; more than a third of them live in extreme poverty.

The MBG research program provides technical assistance and training to scientists from developing tropical countries. The primary focus of MBG research is to provide in-depth studies of tropical plant groups and baseline inventories of selected regions. The results of these studies are often used to suggest conservation priorities and action through recognized international channels. Global cooperation for conservation must be a continuing process and a new international ethic.

This poster is dedicated to the memory of Julian Alfred Steyermark (1909-1988): native St. Louisan, graduate of the Henry Shaw School of Botany at Washington University, Garden curator since 1984, and Guinness' "World Champion Plant Collector." His energy and scholarship enriched all our lives, as well as the literature of botany.

Research at the Missouri Botanical Garden

Forty-two Ph.D.-level scientists, eight of whom live in tropical countries, technical staff and graduate students devote their energies to collecting and studying tropical plants and to exploration of selected regions. These efforts are concentrated in northwestern South America, Central America, Africa and Madagascar.

The individual scientists are specialists in the plants of particular regions or in the classification of certain plant families, such as the economically important grass, legume, and nightshade families. Their research is carried out in collaboration with scientists of the countries in which they are actively working. Together they are attempting to contribute to a common knowledge of the plants that sustain us all, with a view toward conserving and properly utilizing them.

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